1 *A* is (2, 13) and *B* is (10, 1) $\left(\frac{2+10}{2}, \frac{13+1}{2}\right) = (6, 7)$

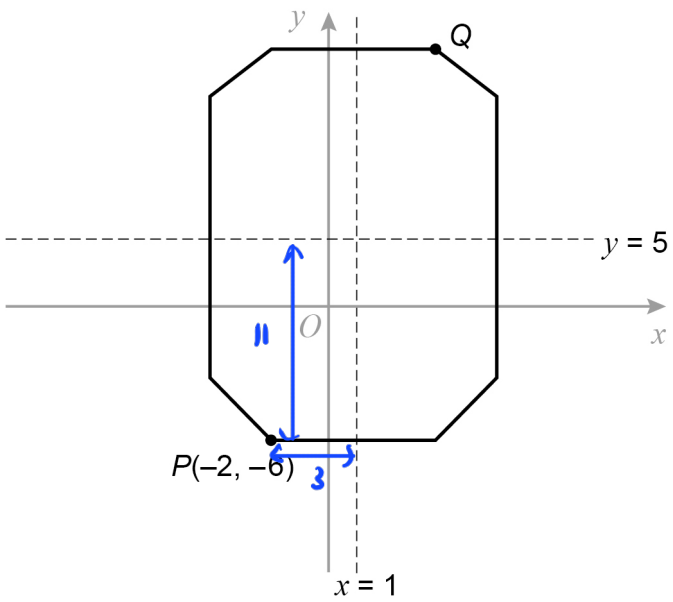
Circle the midpoint of *AB*.

[1 mark]

(4, 6) (5, 6.5) (6, 7) (8, 12)

1

2 The diagram shows an octagon.



Not drawn accurately

$x = 1$ and $y = 5$ are lines of symmetry.

Work out the coordinates of point Q.

[2 marks]

$x = 1 + 3 = 4$

$y = 5 + 11 = 16$

Answer (4 , 16) (2)

3 A line has equation $3y = 3x - 2$

$x = 0$

Circle the coordinates of the intercept of the line with the y-axis.

[1 mark]

$3y = -2$

$y = -\frac{2}{3}$

(0, 1) (0, –1) $\left(0, \frac{2}{3}\right)$ $\left(0, -\frac{2}{3}\right)$

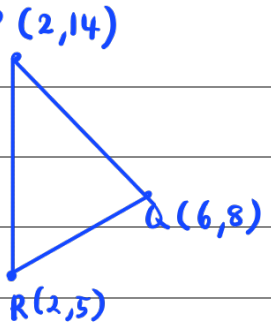
4 *P* is the point (2, 14)

Q is the point (6, 8)

R is the point (2, 5)

Use gradients to show that angle *PQR* is **not** a right angle.

[3 marks]

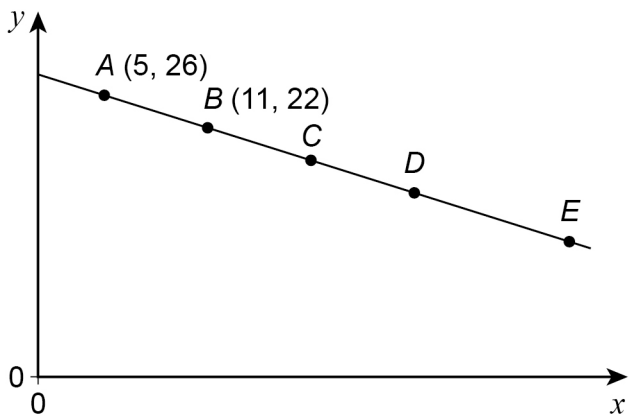


gradient $PQ = \frac{14-8}{2-6} = \frac{6}{-4} = -\frac{3}{2}$ (1)

gradient $QR = \frac{8-5}{6-2} = \frac{3}{4}$ (1)

No. since $-\frac{3}{2} \times \frac{3}{4} \neq -1$. (1)

5 *A*, *B*, *C*, *D* and *E* are points on a straight line.



Not drawn accurately

A, *B*, *C* and *D* are equally spaced.

AD : *DE* = 2 : 1

Work out the coordinates of *E*.

[3 marks]

C : (11+6, 22−4) = (17, 18)

D : (17+6, 18−4) = (23, 14)

A to D : $x = +18$

$y = -12$

D to E : $x = +9$

$y = -6$

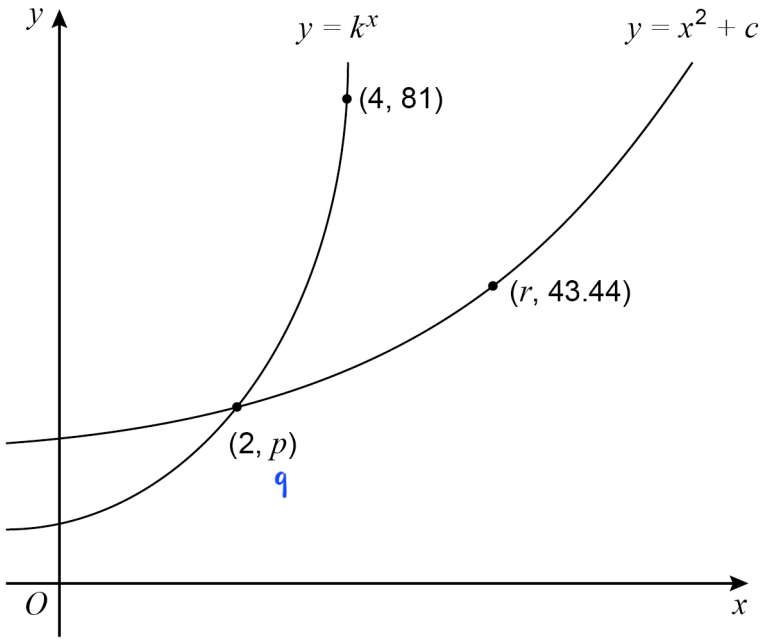
E : (23+9, 14−6) = (32, 8)

3

Answer (32 , 8)

6 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r.

[4 marks]

Using point (4,81) : $81 = k^4$

$k = 3$ (1)

$y = 3^x$

When $x = 2$, $y = 3^2 = 9$ $(p = 9)$

Using point (2,9) : $9 = 2^2 + c$

$c = 5$ (1) , $y = x^2 + 5$

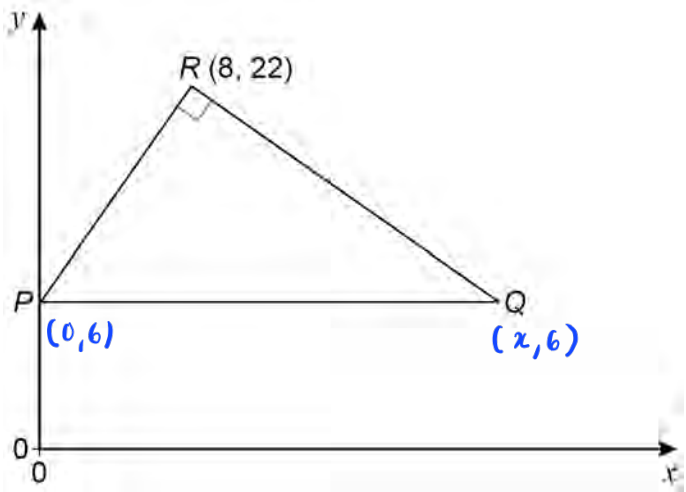
When $y = 43.44$, $43.44 = x^2 + 5$ (1)

$x^2 = 38.44$

$x = 6.2$ $\therefore$ $r = 6.2$

$r =$ 6.2 (1)

7 Points P, Q and R (8, 22) form a triangle.



Not drawn accurately

PQ is a horizontal line, with P on the y-axis.

Angle PRQ is a right angle.

The gradient of PR is 2

Work out the coordinates of Q.

[5 marks]

$m_{PR} : 2 = \frac{22-y}{8-0}$

$2(8) = 22-y$

$y = 22-16$

$= 6$ (1)

$m_{PR} \times m_{RQ} = -1$

$m_{RQ} = \frac{-1}{2}$ (1)

$-\frac{1}{2} = \frac{6-22}{x-8}$ (1)

$-x+8 = 12-44$

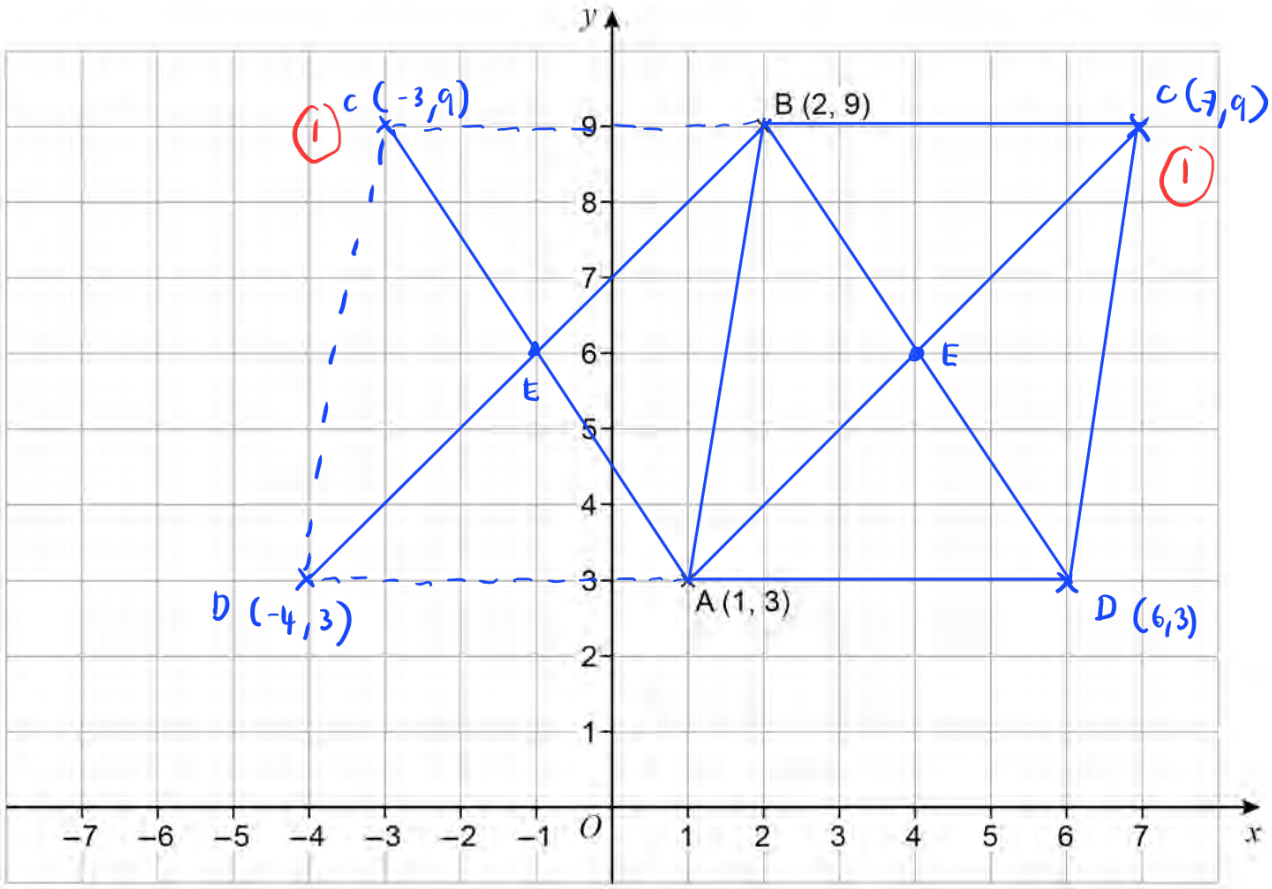
$-x = -40$ (1)

$x = 40$

(1)

Answer (40 , 6)

8 A (1, 3) and B (2, 9) are points on a centimetre grid.



ABCD is a parallelogram.

AD and BC are **horizontal** and each has length 5 cm

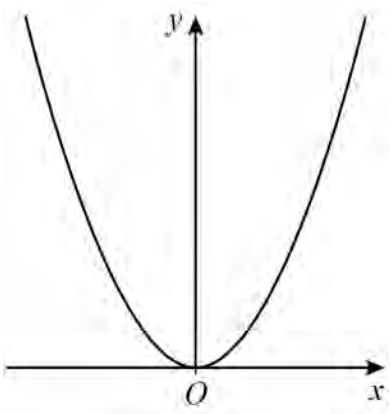
The diagonals of ABCD cross at E.

Work out the **two** possible pairs of coordinates of E.

[4 marks]

Answer (4 , 6) and (−1 , 6)

9 Here is a sketch of $y = x^2$



9 (a) The minimum point of $y = x^2$ is at (0, 0)

Write down the coordinates of the minimum point of $y = x^2 + 2$

[1 mark]

Answer (0 , 2)

1

10 The line with equation $y = 2x + 7$ intersects the y-axis at A.

Complete the coordinates of A.

[1 mark]

Answer (0 , 7)

1

11 A graph has the equation $y = x^2 + px + r$ where p and r are constants.

The graph passes through the points (0, 4), (1, 3) and (8, w)

Work out the value of w.

[4 marks]

at point (0, 4) : $4 = (0)^2 + p(0) + r$, $r = 4$ (1)

point (1, 3) : $3 = (1)^2 + p(1) + 4$

$3 = 5 + p$

$p = -2$ (1)

$\therefore y = x^2 - 2x + 4$

at point (8, w) : $w = (8)^2 - 2(8) + 4$

$= 64 - 16 + 4$ (1)

$= 52$ (1)

$w =$ 52

12 The equation of a line is $y = 3x - 6$

Circle the coordinates of the y-intercept.

[1 mark]

(0, –6) (–6, 0) (0, 3) (3, 0)

13 *P* and *Q* are points.

The x-coordinate of *Q* is 4 **more** than the x-coordinate of *P*.

The y-coordinate of *Q* is 5 **less** than the y-coordinate of *P*.

Work out the gradient of the straight line through *P* and *Q*.

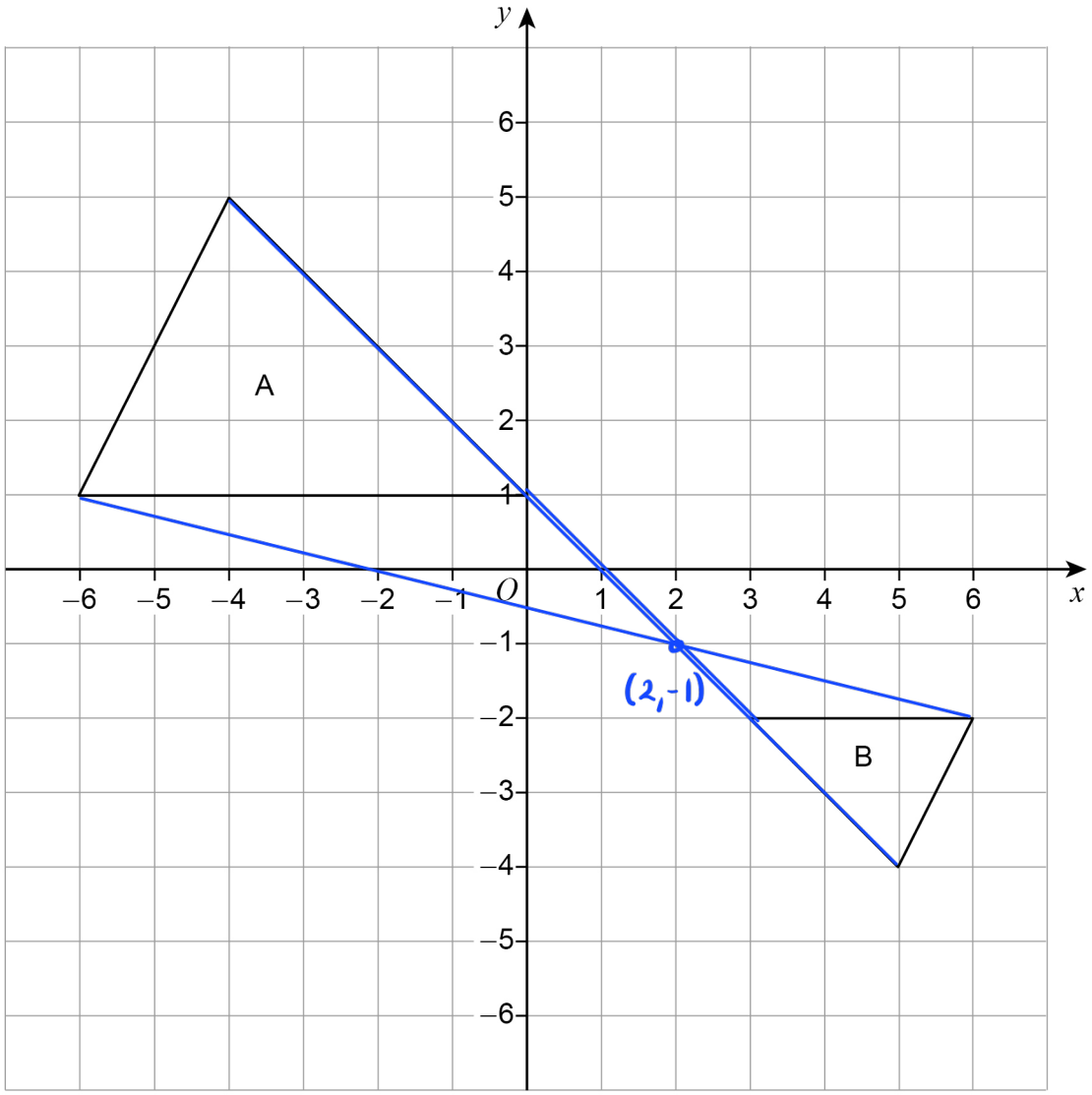
[2 marks]

let P(0,0) , then Q(4,-5)

gradient : $\frac{-5-0}{4-0} = -\frac{5}{4}$

Answer $-\frac{5}{4}$ (2)

14 Shape A is enlarged to shape B.



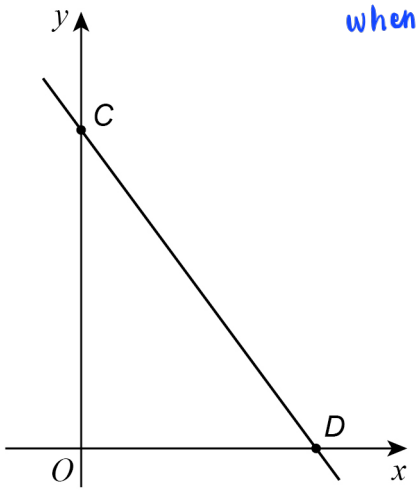
14 (a) Write down the coordinates of the centre of enlargement.

[1 mark]

(1)

Answer (2 , -1)

15 (a) Here is a sketch of the graph $y = -2x + 6$



when $x = 0$, $y = 6$

$y = 0$, $x = 3$

Complete the coordinates of *C* and *D*.

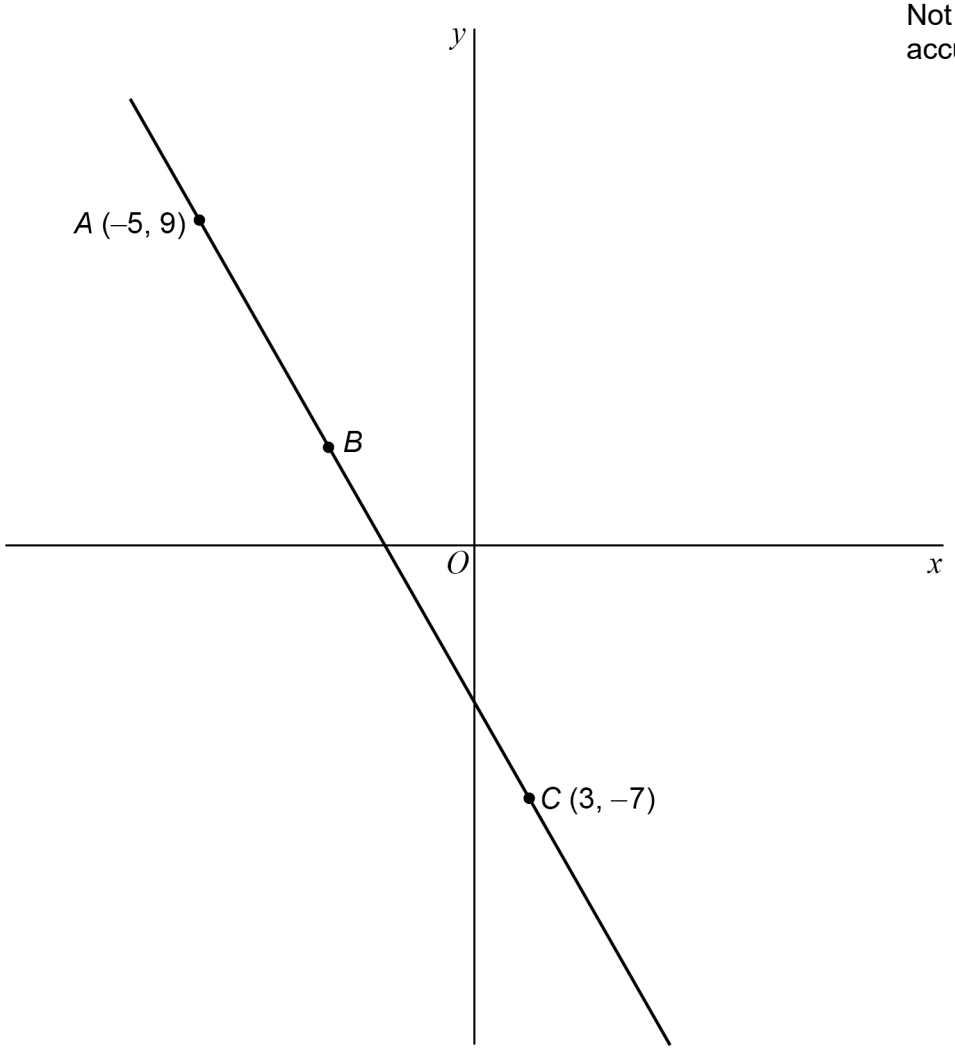
[2 marks]

C (0 , 6) ✓ 0

D (3 , 0) ✓ 0

16 A straight line passes through points A (–5, 9), B and C (3, –7).

Not drawn accurately



16 (a) $AB : BC = 1 : 3$

Work out the coordinates of point B.

[3 marks]

difference in x : $3 - (-5) = 8$

difference in y : $9 - (-7) = 16$ ✓ (1)

x-coordinate of B = $-5 + (\frac{1}{4}(8)) = -3$

y-coordinate of B = $9 - (\frac{1}{4}(16)) = 5$ ✓ (1)

Answer (-3 , 5) ✓ (1)